



Addressing Water Demands Associated with Recreational Facilities

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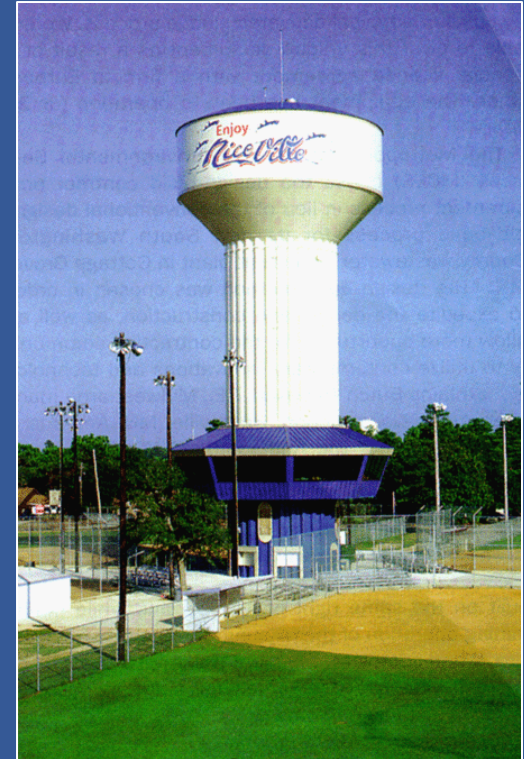
Why Have Recreational Facility Water Demands Increased?

- More golf courses, parks, & sports fields to meet growing demands
- Expanded facilities including: restrooms, spray pools, etc.
- Irrigated sports fields to maximize turf growth & use
- Public expectations & safety concerns



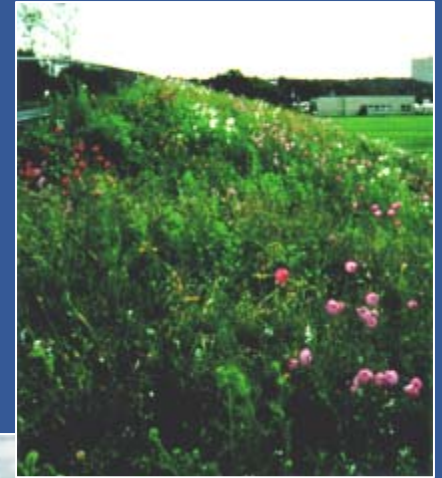
Average Water Use for Recreation Facilities

18-hole golf course (5 mo)	26 mg/yr
Full-size soccer field (5 mo)	1 mg/yr
Little league field (5 mo)	0.5 mg/yr
Restroom/concession facility (7 mos)	0.2-0.5 mg/yr



How do We Address These Growing Water Demands?

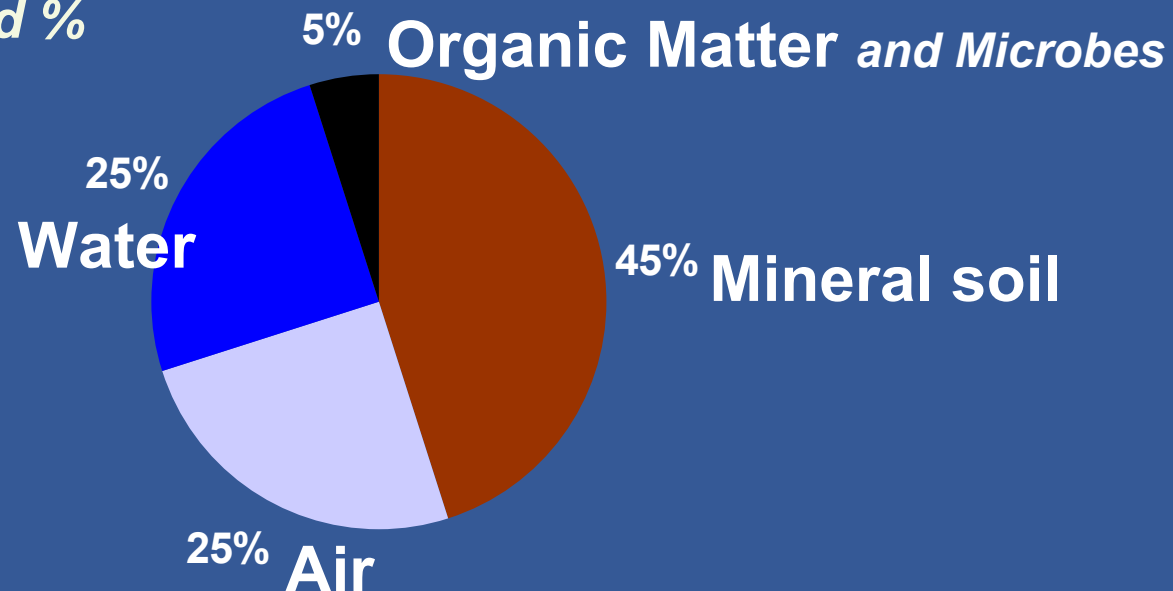
- MA policy on lawn and landscape water conservation
- Facility design, construction and maintenance
- Irrigation system design/coverage limitations
- Irrigation system improvements in operations & controls
- Composting toilets, porta-toilets, etc.
- Artificial turf alternatives
- Alternative water sources including water reuse



Facility Design, Construction and Maintenance

■ **Specifying appropriate field surface materials**

- *Sand drainage layer*
- *Atheletic field topsoil (loam?)*
- *Organic matter and %*
- *Skinned area mix*
- *Pavements*



Facility Design, Construction and Maintenance

■ Choosing the right turf grass

Kentucky Bluegrass

*Sod forming

*Rhizomes

Underground

Creeping stem



Fescue

*Bunchgrass

*Tillers:

Basal growth

Drought tolerant



Perennial Ryegrass

*Bunchgrass

*Tillers

*Quick germination



Facility Design, Construction and Maintenance

■ **Turf establishment**

- *Proper seeding time*
- *Available and adequate water source*
- *Contractor maintenance responsibilities*
- *Grow-in time*
- *Site security*

■ **Transition to Owner**



Facility Design, Construction and Maintenance

- Increase mowing height to reduce turf water demand and increase root depth (especially during non use times)

<u><i>MOW HEIGHT</i></u>	<u><i>ROOT DEPTH</i></u>
4"	8-12"
3"	6-9"
2"	4-6"

Reduced root depth
reduces plant vigor and
increases compaction
potential



Irrigation System Design and Coverage

- Proper professional design
- Head spacing & configuration
- Limit coverage to fields and high-use areas
- Establish irrigation standards
- Install and maintain rain gauges



Irrigation System Operation

- **Irrigate between 12 A.M. AND 6 A.M.**
 - *No impact on field use*
 - *Less wind for improved coverage*
 - *Less evapotranspiration*
 - *Less potential for vandalism*
 - *Allows time for field percolation before use*
- **Establish proper irrigation schedules**

Irrigation System Operation

- **Change current practice of irrigating 20-30 min. per zone/day all Season**
- **Adjust system monthly based on average rainfall and anticipated evapotranspiration**
- **Consider system automation**
- **Perform irrigation system audit to understand proper system operation**



Establishing Monthly Irrigation Needs Based on Difference Between Evapotranspiration and Anticipated Rainfall

← GROWING SEASON →

↓ IRRIGATION SEASON ↓

MASSACHUSETTS	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
Western (Pittsfield)													
RF	3.39	2.69	3.56	3.90	4.00	3.96	4.41	3.73	4.43	3.25	4.06	3.41	44.79
EVT	0.00	0.00	.46	1.51	3.33	4.78	5.77	4.93	3.05	1.61	.58	0.00	26.02
DIFF	3.39	2.69	3.10	2.39	.67	-.82	-1.36	-1.20	1.38	1.64	3.48	3.41	18.77
Central (Springfield)													
RF	3.86	3.10	4.09	3.84	3.58	3.71	3.60	3.79	3.95	3.23	4.14	3.60	44.49
EVT	0.00	0.00	.67	1.79	3.66	5.30	6.38	5.50	3.55	1.89	.76	0.00	29.50
DIFF	3.86	3.10	3.42	2.05	-.08	-1.59	-2.78	-1.71	.40	1.34	3.38	3.60	14.99
Coastal (Boston)													
RF	4.04	3.37	4.19	3.86	3.23	3.17	2.85	3.85	3.64	3.33	4.11	3.73	43.37
EVT	0.00	0.00	.73	1.71	3.37	4.95	6.18	5.48	3.58	2.05	.87	.30	29.22
DIFF	4.04	3.37	3.46	2.15	-.14	-1.78	-3.33	-1.63	.06	1.28	3.24	3.43	14.15
REQUIRED INCHES / DAY (ET DIFF / 31)					.01	.06	.11	.06	.01				

@ PREC. RATE OF .45" / HR FOR STD. IRRIGATION HEADS @ 50' SPACING. JULY PEAK @ .11
 REQUIRES 15 MIN / DAY. .05 AVG ($\frac{26}{5}$)
 REQUIRES AVG. 7 MIN / DAY.

Potential Water Savings for Full Size Soccer Field (2 acres)

Standard 20 min setting = 1.26 mg/yr

(20 min X 60 gal/min/zone X 7 zones = 8,400 gal/day X 150 days)

Approach using evapotranspiration & average rainfall

– Average irrigation setting 7 min/day = 0.53 mg/yr

(7 min X 60 gal/min/zone X 7 zones = 2,940 gal/day X 150 days X 1.2 for climate factor for wind and evaporation)

Result: $\frac{.73}{1.26} = 58\%$ reduction in water use

Consider Artificial Turf Alternative



DAVID KAMERMAN/GLOBE STAFF

A spray of tiny rubber particles is evident in the FieldTurf at Boston College's Alumni Stadium. The rubber fill helps give the surface its cushioning effect.

MAGIC CARPET

The evolution of artificial turf

Athletic fields across the country are replacing their old artificial turf — and in some cases, natural grass — with a new generation of turf that is supposed to play more like real grass.

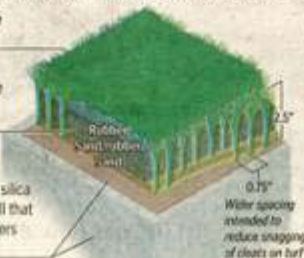
NEW: FIELDTURF

The 'grass'
Plastic fibers slit at the tops to resemble blades of grass

The 'soil'
Rubber from recycled tires or shoes is mixed with silica sand to make up a fill that supports the turf fibers

The base
Turf fibers are woven into a synthetic fabric laid over crushed stone

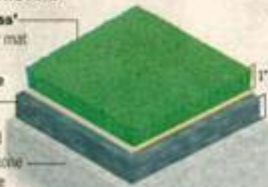
SOURCE: FieldTurf news reports



OLD: ASTROTURF

The 'grass'
Nylon fiber mat

The base
Foam or poured rubber pad
Crushed stone or concrete



It's a smoother, safer ride on newest synthetic surfaces

By Amalie Benjamin

GLOBE STAFF

Quinton Porter exposes the inside of his right elbow, lifting it just high enough to reveal a quarter-sized scab. That's nothing, the Boston College quarterback says. Had he been on AstroTurf, his entire arm might be the deep raised red of the abrasion.

But the old stuff is gone from Alumni Stadium, replaced at the start of the 2004 season with the latest and greatest surface: FieldTurf, a brand of new synthetic turf. It's supposedly the softer, no-turf-burn, low-maintenance magic carpet that's being installed everywhere from the professional levels to that rec league field in the center of town.

It's the catch-all, save-all and, most important, it's not anything like AstroTurf.

"The biggest difference with the FieldTurf is when you fall, it almost feels like you're falling on a bed," BC linebacker Ray Henderson said. "It's really, really soft. [AstroTurf]

ED WIEDERER/GLOBE STAFF

TURF, Page C21

Boston Globe Article
(October 16, 2005)

Advantages of “Infill” Artificial Turf as an Alternative to Natural Turf

- No irrigation
- Increased Infiltration
- No fertilizer
- No mowing
- No herbicides or pesticides
- Lower maintenance
- No play limits
(quantity or time of year)
- Improved safety
- Potential for shared use
to offset costs
- Lower cost long term



Cost Comparison Natural vs. Artificial Turf

Natural Turf Field (100,000 SF)			Artificial Turf Field (100,000 SF)		
Construction		Range of Costs	Construction		Range of Costs
Seed and mulch/sand based sod		\$20,000 – \$70,000	2.5' carpet w/2" rubber-sand infill		\$380,000 – \$500,000
Grow-in maintenance and security		\$25,000 – \$10,000	12" Stone base		\$250,000 – \$250,000
6" Sandy loam layer		\$45,000 – \$50,000	Concrete edge		\$25,000 – \$30,000
6" Sandy gravel drainage layer		\$25,000 – \$35,000	Underdrain system		\$50,000 – \$75,000
Underdrain system		\$30,000 – \$50,000	Subgrade preparation allowance		\$15,000 – \$15,000
Subgrade preparation allowance		\$15,000 – \$15,000			
Irrigation system, service and controls		\$35,000 – \$35,000			
Total		\$195,000 – \$265,000	Total		\$720,000 – \$870,000
Average Construction Cost		\$230,000	Average Construction Cost		\$795,000
Maintenance		Annual Costs	Maintenance		Annual Costs
Insect control (1x@\$500)		\$500	Field grooming and GMAX testing		\$6,000
Crabgrass/weed control (1x@\$500)		\$500	(2x@\$3,000)		
Core aeration (1x@\$500)		\$500	Seasonal field line painting		\$5,000
Deep tine aeration (1x@\$2,500)		\$2,500	(2x@\$2,500)		
Top dress (1x@\$3,500)		\$3,500			
Slice Seed (2x@\$1,000)		\$2,000			
Fertilizer (3x@\$300)		\$900			
Lime (1x@\$300)		\$300			
Irrigation maintenance		\$2,000			
Mowing (26x@\$200)		\$5,200			
Field line painting		\$3,000			
Irrigation water allowance		\$2,000			
Miscellaneous		\$500			
Annual Total		\$23,400	Annual Total		\$11,000
10 Year Total[†]		\$225,000	10 Year Total		\$110,000
Field Repair			Field Repair		
Total Repairs (\$100,000@Year 5 and 10 to resod)		\$200,000	Total Repairs (1,500 per year allowance)		\$15,000
Total 10 Year Costs		\$655,000	Total 10 Year Costs		\$920,000
Number of Plays	Per Year	10 Year Total	Number of Plays	Per Year	10 Year Total
7 months (@30 days less 15% rain days@1 play per day)	179	1790	9 months (@30 days@2 play per day)	540	5400
3 year field loss (for grow in & repairs in yrs 5 & 10)	179	-537	No down time		0
Total Number of Plays		1253	Total Number of plays		5400
Total 10 year Cost Per Play (rounded)		\$520	Total 10 year Cost Per Play (rounded)		\$170*

[†] Turf maintenance for 10 years minus 3 years for line painting during grow-in years.

* Field lighting further reduces cost per play. See back cover.

Natural vs. Artificial Turf Fields Cost Comparison Summary

Field	Cost Per Play (Rounded)
Natural turf	\$520
Artificial turf	\$170
Artificial turf with lights (including electric costs)	\$150
Artificial turf with lights and replacement of turf surface after 10 years	\$200

Alternative Water Sources Other Than Municipal Water Supply

- On-site well
- Stormwater collection and reuse
- Water reuse
- Adequate water source (when you need it)



To Reduce Water Demands for Sports Fields and Recreation Facilities

- Good natural turf field design, with proper field use and maintenance
- Proper irrigation system design and operation
- Consideration of infill artificial turf
- Creative use of alternative water sources

